Impact of Multiple Births on Low Birthweight — Massachusetts, 1989–1996

In Massachusetts during 1989–1996, perinatal health indicators such as infant mortality, teen birth rate, and maternal smoking during pregnancy decreased steadily; however, low birthweight (LBW) (i.e., <2500 g [<5 lbs, 8 oz]) rates increased consistently (*1*). During this same period, the multiple-birth rate (i.e., number of twins and higher order multiple births per 100 live births) increased from 2.5% in 1989 to 3.5% in 1996. Massachusetts has the highest multiple-birth rate in the United States (*2,3*). Multiple births are more likely to result in LBW infants (*2*). To determine the effect of changes in the rate of multiple births on LBW rates and to characterize women who have multiple births, the Massachusetts Department of Public Health examined data on births in Massachusetts during 1989–1996. This report summarizes the results of this analysis, which indicate that the increase in LBW rates in Massachusetts was associated with changes in the rate of multiple births, especially among older, better educated women.

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Data were derived from birth certificates of infants born to women who resided in Massachusetts during 1989–1996. Plurality is classified as singleton, twin, and triplets-plus (i.e., multiple births of three or more infants). Two categories of maternal education were analyzed: high school education or less and four or more years of college. Adjusted LBW rates were calculated by applying the plurality-specific LBW rate in a given year to the plurality distribution in 1989. The adjusted LBW rate can be interpreted as the LBW rate in a given year had the plurality distribution been the same as in 1989. The difference between the adjusted and unadjusted LBW rates indicates the effect of the change in the distribution of plurality on LBW rates.

From 1989 to 1996, the LBW rate for singletons remained constant at 4.8% (Table 1). However, the proportion of twins increased from 2.4% to 3.3%, and the LBW rate among twins increased slightly from 45.8% to 48.2%. The largest plurality-specific increase in births was among triplets-plus, which increased from 0.1% of all births in 1989 to 0.2% in 1996. The LBW rate for triplets-plus did not change substantially from 1989 through 1996, ranging from 84% to 92%.

The unadjusted LBW rate increased 8% during 1989–1996 (Table 1). However, when LBW rates were adjusted for the increase in multiple births, LBW rates for 1989 and 1996 were the same (5.9%).

In 1989, multiple-birth rates by maternal education level were similar: for women with a high school education or less, the rate was 2.4%, compared with 2.5% for women with four or more years of college (Table 2). From 1989 to 1996, the proportion of multiple births to women with high school education or less increased from 2.4% to 2.8%, and the proportion of multiple births to women with four or more years of college increased from 2.5% to 4.2%. Among women aged ≥35 years and with four or more years of college, the proportion of multiple births increased from 3.2% to 5.8%. Although the overall number of births in Massachusetts decreased 12% from 1989 to 1996, the number of multiple births increased 24%. Among women aged ≥35 years, the number of multiple births more than doubled. From 1989 through 1996, unadjusted LBW rates for infants born to women aged <35 years with a high school education or less declined slightly from 7.1% to 7.0%; among women aged <35 years with four or more years of college, the LBW rate increased 22%, from 4.1% to 5.0%. Among women aged ≥35 years, LBW rates increased 27% among less educated women (7.8% to 9.8%) and 30% (5.0% to 6.5%) among more educated women.

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Editorial Note: The findings in this report indicate that the increase in the proportion of multiple births is directly responsible for the increase in crude LBW rates in Massachusetts from 1989 to 1996. These findings are consistent with national data that indicate state LBW rates are affected by twin birth rates (*4*).

This analysis highlights two issues. First, although multiple births constitute a small proportion of all live-born infants, the large increase in multiple births substantially influences trends in LBW. Routine birthweight surveillance trend data should be adjusted for, or stratified by, plurality. Second, the characteristics of mothers giving birth to LBW infants changed during this time period. For example, in 1989, 59% of LBW infants in Massachusetts were born to women who had a high school education

TABLE 1. Number of births and percentage distribution of births and low birthweight (LBW) infants, by plurality, and unadjusted and adjusted LBW rates* — Massachusetts, 1989–1996

Year	No. births	Singletons		Twins		Triplets-plus†		Multiple: % of births	Unadjusted LBW rate	Adjusted LBW rate
		% of births	% LBW	% of births	% LBW	% of births	% LBW			
1989	91,314	97.5	4.8	2.4	45.8	0.1	87.7	2.5	5.9	5.9
1990	92,460	97.4	4.7	2.5	46.5	0.1	88.9	2.6	5.8	5.8
1991	88,176	97.3	4.7	2.6	47.2	0.1	84.3	2.7	5.9	5.8
1992	87,202	97.2	4.7	2.7	45.3	0.2	87.2	2.8	5.9	5.7
1993	84,627	97.0	4.8	2.8	46.7	0.2	86.8	3.0	6.2	5.9
1994	83,758	96.9	5.0	2.8	47.7	0.3	92.5	3.1	6.4	6.0
1995	81,562	96.8	4.9	3.0	46.5	0.2	90.4	3.2	6.3	6.0
1996	80,167	96.5	4.8	3.3	48.2	0.2	86.1	3.5	6.4	5.9

* Per 100 live births.
† Multiple births of three or more infants.

TABLE 2. Number of births and percentage distribution of multiple births and low birthweight (LBW) infants, by maternal education, age group, and year — Massachusetts, 1989–1996

Year	Aged <35 years						Aged ≥35 years						Total*					
	≤High school			≥4 Years college			≤High school			≥4 Years college			≤High school			≥4 Years college		
	No. births	% LBW	% Multiple	No. births	% LBW	% Multiple	No. births	% LBW	% Multiple	No. births	% LBW	% Multiple	No. births	% LBW	% Multiple	No. births	% LBW	% Multiple
1989	41,453	7.1	2.3	18,761	4.1	2.4	2,641	7.8	3.5	5,381	5.0	3.2	**44,095**	**7.1**	**2.4**	**24,143**	**4.3**	**2.5**
1990	41,325	6.9	2.4	19,614	4.5	2.3	2,939	9.2	3.6	5,898	5.5	3.7	**44,264**	**7.1**	**2.4**	**25,512**	**4.7**	**3.2**
1991	38,789	7.1	2.3	18,933	4.2	3.2	2,906	7.7	3.0	5,938	5.5	4.4	**41,698**	**7.2**	**2.4**	**24,872**	**4.5**	**3.5**
1992	36,585	7.0	2.4	19,578	4.2	3.2	3,095	9.2	3.4	6,319	5.3	4.1	**39,682**	**7.2**	**2.5**	**25,897**	**4.5**	**3.4**
1993	34,310	7.2	2.3	19,712	4.3	3.5	3,187	9.0	3.4	6,490	6.1	5.3	**37,500**	**7.4**	**2.4**	**26,205**	**4.8**	**3.4**
1994	32,713	7.7	2.6	20,051	4.7	3.3	3,121	8.9	3.5	6,987	5.9	5.3	**35,834**	**7.8**	**2.7**	**27,038**	**5.1**	**3.8**
1995	29,759	7.3	2.4	20,250	4.8	3.3	3,155	10.0	4.1	7,479	6.0	5.7	**32,915**	**7.6**	**2.5**	**27,730**	**5.1**	**3.4**
1996	27,054	7.0	2.5	21,402	5.0	3.6	3,146	9.8	4.6	8,075	6.5	5.8	**30,200**	**7.3**	**2.8**	**29,477**	**5.4**	**4.2**

* Numbers may not add to total because of missing data.

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or less. By 1996, 43% of LBW infants were born to women who had a high school education or less. From 1989 to 1996, the proportion of LBW infants born to women aged >35 years doubled (from 11% to 22%).

The increase in multiple births and LBW rates, particularly among older women, may result from increased use of fertility drugs and assisted reproduction technologies (*5*). In Massachusetts in 1996, based on new data recorded on Massachusetts birth certificiates, fertility drugs or assisted reproduction technologies were used by 13% of mothers with multiple-birth deliveries, compared with 0.7% of mothers with singleton births. Massachusetts law, which requires insurance companies, health-maintenance organizations, and medical assistance to cover medically necessary expenses of infertility diagnosis and treatment, and the state's aging birthing population may have increased the use of assisted reproduction technologies (*6*). In addition, better educated women may be more sophisticated users of reproductive assistance and have the financial resources for the additional costs of fertility treatment.

The findings in this report are subject to at least two limitations. First, newly collected data on birth certificates about use of fertility drugs and assisted reproduction technologies may be underreported. Second, other factors that may affect change in LBW (e.g., smoking) were not included in this analysis.

The public health implications for targeting services for this emerging LBW infant population and their mothers are substantial. Multiple gestation increases morbidity risks for infants and mothers (*2,7*) and mortality risks for infants (*8*). Programs such as high-risk infant identification, congenital anomaly surveillance, and delivery of early intervention services must be reevaluated as a result of these changes in the birthing population.

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